Congress of the United States
Washington, DC 20510

March 21, 2022

Administrator Bill Nelson
National Aeronautics and Space Administration
300 E. Street SW
Washington, DC 20546

Dear Administrator Nelson:

We write in support of NASA Glenn Research Center (Glenn or GRC), both the Lewis Field campus and the Neil A. Armstrong Test Facility (ATF). In advance of the Fiscal Year 2023 (FY23) budget request, we would like to highlight areas of excellence where Glenn is prepared to lead: surface power; electric propulsion; space communications; flight hardware testing; and aeronautics, including hypersonics and sustainable aviation.

NASA showcases many of America's greatest strengths, from technological innovation and engineering excellence, to a boundless scientific curiosity about the universe around us. We commend you for your strong leadership of the Agency during the past year. Despite the challenges of a global pandemic, NASA successfully landed the Perseverance rover on Mars, sent Lucy to the Trojan asteroids of Jupiter, launched the James Webb Space Telescope, and completed critical milestones for the Artemis missions to the Moon. Each of these missions, and many others, relied on the unique engineering expertise and testing capabilities of Ohio's NASA Glenn Research Center.

Surface Power: GRC specializes in surface power technology, especially the conversion of diverse power sources to electricity and power distribution. A reliable source of surface power will be essential to NASA's human and robotic exploration of the Moon and Mars. While conventional solar power is suitable for the short surface missions of Apollo, the Agency's more ambitious plans will require other power sources. The Artemis missions, for example, seek to establish a sustained human presence on the Moon, where lunar night lasts two weeks and regions containing valuable resources like water ice lie in permanent shadow. Fission Surface Power (FSP) technology being developed at GRC is essential for these mission classes. Although initial concept studies are underway, increased support is urgently needed for FSP to be operational when Artemis missions bring humans back to the Moon to stay.

Electric Propulsion: Advancements in propulsion are opening up new mission concepts, from efficient, time-saving trajectories to Mars, to long-duration journeys unconstrained by onboard fuel. Much of this ground-breaking work is being done at GRC, including Nuclear Electric Propulsion and Solar Electric Propulsion. Every electrical propulsion device of U.S. origin has come through the center's testing facilities and relied on the expertise of Glenn engineers. In some cases, these thrusters are employed on NASA missions like Lucy, Double Asteroid Redirection Test (DART), and Gateway's Power and Propulsion Element. But often the technology supported by Glenn benefits commercial partners, aiding in the development of advanced thrusters that NASA can then simply purchase. This is just one example of government expertise at GRC serving as a catalyst for the growth of U.S. industry.

Space Communications: GRC is at the forefront of leveraging the growing private space industry through the Commercial Services Program (CSP). Commercial satellite communication systems currently support thousands of commercial and government customers around the world. With a long history of pioneering space communications work, Glenn is well-suited to ensure companies have the ability to meet NASA mission requirements and lead a smooth transition away from the legacy systems owned and operated by the government. This new approach will be more versatile and responsive to rapidly evolving communications technology and provide significant cost savings.

Flight Hardware Testing: The United States still reaps the benefits from infrastructure investments made decades ago. NASA is no exception. Our nation's civil, commercial, and national security space sectors all rely on GRC facilities for testing space flight hardware. These facilities, and the experts who operate them, are each unique. ATF, for example, includes the world's only facility capable of testing full-scale, upper-stage launch vehicles and rocket engines under simulated space conditions; the world's largest space environment simulator; and the world's most powerful vibe table and most powerful reverberant acoustic test chamber. NASA's Orion crew capsule, SpaceX's Crew Dragon, and Blue Origin's New Shepherd are just a few of the high-profile spacecraft that have relied on GRC for critical testing. Many of these testing facilities were constructed over sixty years ago but are still unmatched in their capabilities.

Upgrading and re-activating existing equipment would bring GRC's test facilities up to their original design specifications and capitalize on decades of investment. Maintenance of shared infrastructure, like electrical grids and roads, would allow industry, NASA, and the DOD to fully utilize Glenn's testing capabilities. But it is not enough to merely sustain current testing infrastructure; a combination of consolidation and improvement of facilities must be used to purposefully evolve and meet the Agency's future needs.

Aeronautics: Aeronautics is another fast-changing area with close partnership between GRC and industry. Nearly all ice protection technologies in use today were developed at GRC, with its Icing Research Tunnel and on-site pilots and research aircraft. Glenn's wind tunnels are used by every engine manufacturer to test aircraft propulsion systems and parts over a wide range of altitude and speed conditions up to Mach 4 and 90,000 feet. Clients span private, civil, and national security aeronautics, and testing facilities are fully booked for the next three years; requests extend into the late 2020s.

Aeronautics – Hypersonics: Hypersonics research, encompassing materials and other technology for flight above Mach 5, is increasingly important to U.S. national security. GRC's Hypersonics Tunnel Facility and subject matter experts are an invaluable asset to NASA, the Department of Defense, and other researchers.

Aeronautics – Sustainable Aviation: GRC is leading on transformative developments in aircraft power and propulsion that will make aviation more sustainable. As the administration pursues technology investments to lower emissions, aviation must be a priority. A transition to Sustainable Aviation Fuels will provide near-term improvements, but meeting long-term goals will rely on technologies where Glenn leads, like engine efficiency gains through HyTEC,

electric aircraft propulsion at transport scale via the NASA Electric Aircraft Testbed (NEAT), and Advanced Air Mobility (AAM) concepts like vertical take-off and landing.

Ohio is the ideal place to advance the technologies discussed here. The birthplace of aviation and home to more than twenty astronauts, Ohio is also one of the largest suppliers of airplane components and a national leader in manufacturing. With fourteen public universities and a dozen federal research labs, the state has long been engaged in cutting-edge research and has a robust pipeline for training an innovative science, technology, engineering, and mathematics (STEM) workforce. It is clear that NASA Glenn's current areas of leadership are only the beginning of what the Center can do. Already every federal dollar spent at NASA Glenn is estimated to result in three dollars spent by private companies, but organizations across the state are eager to multiply this impact if given the opportunity. To this end, we urge the following:

1. The Inspector General's 2017 report on "right-sizing" the Agency (IG-17-015) describes the evolution from "ten healthy centers" to the Capability Leadership Model. Under the Agency's current model for balancing capabilities across centers, we urge you to recognize Glenn's technical leadership in surface power, electric propulsion, and hypersonics.

2. More than 75 percent of NASA's constructed infrastructure is beyond its design life and the Agency has a deferred maintenance backlog of more than $2.66 billion. A recent Inspector General report (IG-21-027) found that this deferred maintenance has resulted in "unscheduled rather than scheduled maintenance costing up to three times more to repair or replace equipment and facilities after they have failed." Maintenance of horizontal infrastructure and facilities is a chronic challenge at NASA Glenn and across the entire Agency that demands immediate attention. We ask that the Agency revise its Construction of Facilities (CoF), Center Management and Operations (CMO), and demolition funding to address these issues.

3. Fission Surface Power (FSP) will be essential to a sustained human presence on the Moon. At a recent House Space, Science and Technology Committee hearing, Associate Administrator for Exploration Systems Development James Free described a comprehensive Artemis plan that will be delivered to Congress soon; we urge you to include FSP in this plan. Furthermore, the enacted Consolidated Appropriations Act of 2022 calls for NASA to submit a "multi-year plan that enables technology development leading to an in-space propulsion demonstration and describes future missions and propulsion and power systems enabled by this capability." We request that you include FSP as one of the power systems in this report and share it with our offices.

4. Finally, we urge you to improve NASA field center collaboration with academia. The Space Communications and Navigation (SCaN) summer intern program is a model for engaging STEM students of all ages with NASA's inspiring work; this program was started at NASA Glenn and expanded to other centers. We hope to see an increase in the number of internship opportunities at NASA Glenn and encourage headquarters to give NASA field centers more authority to use funding for university grants.

We urge you to take full advantage of the expertise and capabilities of NASA Glenn and the Ohio aerospace industry. We appreciate your consideration of this letter and timely response. Please reach out if we can assist in any way.

Sincerely,

Sherrod Brown
United States Senator

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United States Senator

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Member of Congress

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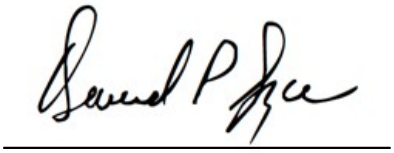

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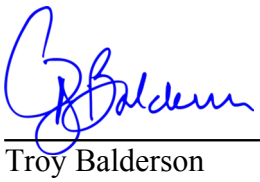

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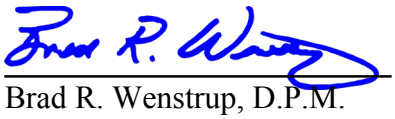

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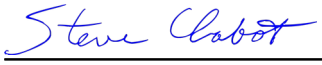

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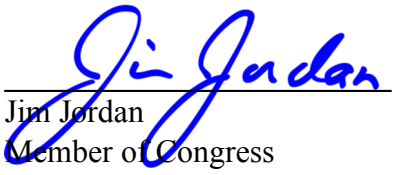

Jim Jordan
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cc: Shalanda Young
Director, Office of Management and Budget